THE VETERINARY RECORD

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 28. JULY 26, 1947 VOL. 59.

Penicillin*

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The inhibition of the growth of one micro-organism by the growth of another is a well-known phenomenon and it was suggested about 70 years ago that such antagonism might be of value for therapeutic purposes. These antibacterial substances are formed by a variety of bacteria and moulds and deliberate searches have been made for such substances to perform specific functions. Bacteria have been grown in a medium containing the polysaccharides of a Type 3 pneumococcus as a sole source of carbon, thereby endeavouring to find one whose enzymes would destroy the polysaccharides. Serial subcultures have also been made of samples of soil in a medium containing large quantities of the dead cocci and thus favouring the growth of bacteria most capable of utilizing the dead cocci as a source of food (Dubos, 1935, 1939). Of the bacteria isolated and studied, one of them, *B. brevis*, forms two antibacterial substances, tyrocidin and gramicidin; the former is toxic for animal tissues whilst the latter will protect mice against certain bacterial infections although it is moderately toxic. The discovery of penicillin was largely accidental; Fleming (1929) found that the staphylococcal colonies around a colony of a contaminating mould, which had developed on a plate culture, were showing signs of dissolution although they had previously been well formed. This mould was later identified as a strain of *Penicillium notatum* and was able to produce a powerful but unstable antibacterial substance when grown in fluid medium. The substance was called penicillin and although it withstood boiling for a few minutes, its activity was reduced after boiling in an alkaline solution for an hour and practically destroyed after autoclaving at 115° C. for half an hour. Its action was most marked against the pyogenic cocci and the diphtheria group of bacteria whilst the coli-typhoid and influenza groups were insensitive to it. An important characteristic concerned its non-toxicity, for Fleming showed that it was not only non-irritant but it did not interfere with the function of leucocytes. He suggested that it might be an efficient antiseptic for application to, or injection into, areas infected with penicillin-sensitive organisms. Clutterbuck, Lovell & Raistrick (1932) used a synthetic medium for its production and found penicillin to be moderately stable at *p*H 5 to 6, although concentration of the filtrate at 40° C. under reduced pressure resulted in loss of activity; the active principle could be extracted by ether in an acid medium but inactivation occurred on evaporation of the ether. The important advance made by Florey and his colleagues a few years later (see Florey, 1944) concerned this point, for they found that if the ethereal solution was shaken with an aqueous solution of an alkali the active principle passed back into the aqueous solution. It thus became possible to effect an appreciable concentration and purification, and other solvents were used such as chloroform and amyl acetate. An aqueous solution containing an alkali salt of penicillin was thus obtained, for penicillin is an acid; this solution could be frozen and by evaporating the water from it while in the frozen state a dry preparation was obtained which retained its activity for long periods. Although it is now known that these early preparations contained only about 1 per cent. of actual penicillin, they were able to inhibit the growth of staphylococci in dilutions of about 1:500,000. Furthermore, mice infected with streptococci, staphylococci or *Clostridium septique* survived when penicillin was injected at frequent intervals over a period of several days. It was thus revealed that penicillin combined great antibacterial powers with low toxicity and was likely to be of great value in therapeutics. During the winter and spring of 1940-41 human patients were treated with penicillin, most of them with staphylococcal infections, and the results were sufficiently encouraging for Florey and his colleagues to persevere with their work and to ask the aid of American workers for large-scale production.

* Presented to the Sussex Division, N.V.M.A., at Brighton, March 28th, 1947. Paper read by Dr. Montgomerie in the absence of Dr. Lovell through indisposition.

The manufacture of penicillin is beset with difficulties, for the active principle, in its crude state, is unstable and present in small amounts only; as the mould *P. notatum* grows at about neutrality there is always a risk that the culture may contain contaminating bacteria which will destroy the penicillin as it is produced. Many common bacteria produce an enzyme, penicillinase, which is the substance responsible for the destruction of the penicillin. At first, all penicillin was prepared by growing the mould on the surface of media in flasks; this technique has been replaced by a submerged culture one, in which steel vessels with a capacity of 10,000 gallons or more are used. Various media are used but most contain lactose and corn steep liquor and during growth an ample supply of sterile air is introduced. The temperature of the medium is controlled at 23 to 24° C. and assays of the penicillin concentration are made at intervals. The methods of extraction also vary and may be by the addition of charcoal followed by acetone, or by the alternate transference of penicillin to an organic solvent and to a dilute aqueous solution of sodium bicarbonate, or, to an aqueous suspension of chalk. On adding aqueous sodium bicarbonate, sodium penicillin is formed and goes into solution. Further purification is effected and the final salt is freeze-dried after which it is assayed for potency, tested for sterility and injected into mice and rabbits.

Other strains of *Penicillium* are now used for the preparation of penicillin and one of the best appears to be one recovered from a mouldy cantaloupe found in Peoria market. In an attempt to increase the yield of penicillin some strains have been exposed to X-rays and to ultra-violet light; one strain, after a few cubcultures in 0·2 per cent. colchicine, gives from six to eight times greater amounts of penicillin than the original strain of *P. notatum* (Gordon & McKechnie, 1945).

By special methods of extraction, pure penicillin may now be prepared and it is known that there are at least four penicillins, all of which are potent and all having the molecular formula of $C_9H_{11}O_2N_2S.R$, the radical R varying. They are known as: penicillin I (F), II (G), III (X), IV (K). Penicillin II is apparently the common form and IV has some unpleasant properties. The type produced depends on the strain of mould used and the conditions of growth.

The stability of the solid salts of penicillin is largely dependent on the exclusion of moisture and if this is achieved the drug has a storage life of at least a year. On the other hand, aqueous solutions will decompose rapidly, especially if they are kept at a high temperature or become contaminated. Minute traces of copper, lead, zinc and mercury have a deleterious effect; alcohol and glycerin may also reduce the potency whilst some samples of rubber tubing have a similar action; repeated sterilization of the tubing tends to increase the rate of inactivation.

There are two methods of assay in current use. The first is known as the Cylinder-Plate method and depends on the comparison of zones of inhibition of the growth of the test organism produced by known quantities in porcelain cylinders, the cylinders being placed on solid media which are flooded with the test culture. The second is the Broth Dilution Method in which the penicillin is diluted in broth and the test organism is inoculated into the series of tubes; after incubation the dilution at which inhibition occurs is compared with a standard set of tubes put up at the same time. In both methods the test organism is usually a staphylococcus although other susceptible organisms have been used. A standard preparation of the drug is kept by the Medical Research Council and is believed to contain 99·75 per cent. penicillin II and 0·25 per cent. penicillin IV. The international unit is the specific activity contained in 0·6 microgram (0·0006 milligram) and differs only slightly from the Oxford unit. At the moment penicillin is controlled by Government departments; broadly speaking, its manufacture, purity, and activity are dealt with by the Ministry of Health and its distribution by the Ministry of Supply. Pure penicillin contains 1,666 units per milligram and the penicillin salts supplied contain not less than 300 units per milligram; solutions contain not less than 2,000 units per c.c. The toxicity of the standard preparations should be of such a low order that the intravenous injection of 1,000 units into mice should not cause death in 24 hours. The intravenous injection of 2,000 units into rabbits should not cause a rise in temperature of more than 0·6° C. within three hours of the injection.

The bacterial species which are sensitive to penicillin include streptococci, staphylococci, members of the Clostridium and Corynebacterium groups, the anthrax bacillus, strains of Actinomyces and certain spirochaetes. With the exception of the meningococcus and the gonococcus most Gram negative ones are not susceptible; the tubercle bacillus, most viruses and trypanosomes are also insensitive. In low concentrations penicillin is considered to be bacteriostatic, and bactericidal in higher concentrations. Sensitive bacteria subjected to an amount of penicillin insufficient to stop growth show alterations in their morphology (Gardner, 1940), and when greater quantities of penicillin are added complete sterilization is not obtained; a few bacteria remain unaffected and these are capable of growth when they become susceptible to penicillin (Bigger, 1944). Amongst the sensitive species of bacteria, certain aberrant strains are found which are resistant; furthermore, by growing even a sensitive strain in gradually increasing quantities of penicillin a toleration to higher concentrations is obtained. This acquired resistance disappears on subsequent subculture in a penicillin-free medium. Resistance *in vivo* is only rarely developed and is different from that observed with the sulphonamides.

Penicillin is administered in a variety of ways with the object of allowing the drug to come into actual contact with the infecting bacteria; the maintenance of a sufficient concentration is an additional objective. After parenteral injection there is an absorption into the blood stream and the concentration falls rapidly; a great part of that injected is excreted in the urine, and small amounts are excreted through the bile and saliva whilst some is inactivated in the body. Certain tissues are apparently impermeable, for little is found in the cerebro-spinal fluid after intramuscular injection unless the patient is suffering from meningitis, when significant amounts are found. Not only is the blood-brain barrier relatively impermeable but the mammary gland is as well and for mastitis therapy the drug must be given by the teat canal. The acid secretions of the alimentary tract make the oral route a relatively intractable one although penicillin is said to be more effective by this route when given to patients suffering from achlorhydria; in any case larger doses have to be given and trials have been made to combine mechanical protection of the drug with reduction of the acidity of the mouth and stomach. As aqueous solutions are rapidly absorbed and excreted after parenteral administration, trials are also being made in which penicillin is incorporated in a mixture of beeswax and arachis oil, thereby prolonging its action; a B.P. preparation is available but oily injections tend to produce some soreness at the site of injection. Some authors have suggested that the concurrent administration of one of the sulphonamides enhances the potency of penicillin but the effect may merely be an additive one. On the other hand, sulphonamide-fastness is different from penicillin-fastness and a combination is of value when dealing with a strain of an otherwise sensitive species which is resistant to sulphonamides; some human cases of gonorrhoea are caused by a sulphonamide-resistant strain of gonococcus and they yield to this form of treatment.

Common methods of administering penicillin include: frequent intramuscular injections; continuous intravenous drips, sprays; wet dressings; intramammary infusions; and the use of creams, ointments, lozenges and pastilles. There are many B.P. and non-official formulae devised for different purposes and the selection must depend on the type of disease. A few simple rules for treatment with penicillin are as follows:—

(1) It should be used only when the infection is caused by a penicillin-sensitive organism.

(2) It must be given in such a way that it comes into contact with the infecting organism.

(3) The dose must be such that in the infected area the concentration is sufficient to destroy the bacteria.

(4) Treatment should be persisted in until the infection is overcome.

Owing to the limited supply of penicillin for veterinary purposes its value in the treatment of animal diseases has not been as fully determined as in the treatment of human infections.

Bovine mastitis.—As the udder is not permeable to penicillin after intramuscular or intravenous inoculation the administration for mastitis is by intramammary infusion. The dosage for *Strept. agalactiae* infections varies up to 200,000 units per quarter and reports in this country advocate smaller doses; about 80 per cent. of cases have been cured after two infusions of 20,000 units in 50 c.c. of sterile water or saline given on succeeding days (Anon., 1946). The udder should of course be empty for there is an inverse ratio between the concentration and the volume of milk, the loss being greater in an actively functioning udder. Reports from America suggest that 25,000 to 50,000 units once daily for four days is a useful routine procedure whilst Byrne and his colleagues (1946), working in Canada, prefer 40,000 units with intervals of four days between. Other forms of streptococcal mastitis have been successfully treated with penicillin but staphylococcal forms, especially the catarrhal one, are more difficult and relapses are frequent. Although *Corynebacterium pyogenes* is sensitive to penicillin *in vitro* the results of treating summer mastitis with penicillin are disappointing.

It must be remembered that bovine mastitis is not an entity from the bacteriological aspect and the pathology varies according to the cause. If *Strept. agalactiae* infections are regarded as localized types of disease and the staphylococcal and *C. pyogenes* forms as localized forms of more generalized infections, then penicillin may reach the infecting organisms in the former but not in the latter two. Whilst this may be considered to be merely hypothesis there is some factual basis, for whereas the main reservoir of *Strept. agalactiae* is the udder, staphylococci and *C. pyogenes* are frequently recovered from other sites in the animal body.

Cystitis and pyelo-nephritis of cattle.—The causal organism of this condition is *Corynebacterium renale* which is sensitive to penicillin *in vitro*. Experimental work in mice has shown that if given early in the course of the disease, penicillin will protect a high proportion of the infected animals (Lovell & Cotchin, 1947). In the natural disease in cattle, diagnosis is not made till there is considerable damage to the urinary tract and penicillin therapy may not be so efficacious. There are, however, records of success and Beck *et al.* (1945) injected 300,000 units every four hours for five days into a number of cows with clinical symptoms. In all, 10 million units were given to each animal by the intramuscular route. Disappearance of haematuria and other symptoms followed but relapses occurred in some cases. There is thus some evidence that penicillin is of value in this disease but it is not easy to assess its actual worth because of the chronic nature of the disease and because of the tendency for some infected animals to show periodical improvement without treatment.

Strangles in horses.—The causal organism of strangles is sensitive to penicillin *in vitro* and a few reports have been made which show that the disease is amenable to penicillin therapy. Semtner (1945) gave from five to nine intramuscular injections of 100,000 units of the calcium salt to ten horses; the injections were given every three to four hours and six of the horses recovered completely and the other four showed improvement but relapsed. There are other records of success and a further report of a rapid recovery by the combined use of penicillin and sulphamerazine.

There are many other diseases of animals in which it is expected that penicillin will be of value. The anthrax bacillus is sensitive to penicillin *in vitro* and human cases have responded to treatment. Owing to the nature of this disease it is not likely that it will function as a therapeutic agent in anthrax in cattle unless it is used on animals showing high temperatures and suspected of infection, because of the history of a previous case. Some strains of Actinomyces and some of the members of the Clostridium group are sensitive to penicillin and human infections with both species of bacteria have been subjected to penicillin therapy. Doll & Dimock (1946) tested the sensitivity of several of the bacteria which are known to infect horses and from their work suggested that whereas infections with streptococci and staphylococci should yield to treatment, it was unlikely that infections due to *Corynebacterium equi* or to *Bact. equirulis* would be effectively treated in this way. There is some difference of opinion concerning the probable effect of penicillin therapy in swine erysipelas although it is agreed that *Erysipelothrix rhusiopathiae* is sensitive to penicillin *in vitro*, and both mice and pigeons which have been infected artificially have responded to treatment (Heilman & Herrell, 1944; Van Es *et al.*, 1945). The doubt has been expressed as to whether the natural disease in pigs will yield to treatment for, if so, large doses will have to be given and administered in the early stages of the disease; human cases of erysipeloid respond to penicillin therapy. It is probable that many other diseases of animals will be treated successfully with penicillin and odd cases of pneumonia in calves and sheep have benefited. It is also worth recording that the sensitive organisms include *Leptospira icterohaemorrhagiae* and that infection in human beings with this spirochaete has been overcome with penicillin; it may prove of value in dogs. A recent report (Cooper & Robson, 1947) of the successful treatment of a case of septicaemia in a woman caused by *Fusiformis necrophorus* suggests that penicillin is worthy of trial in cases of calf diphtheria and other infections due to the necrosis bacillus.

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DISCUSSION

The discussion was opened by Dr. Brownlee, who prefaced his remarks by saying that he was envious of Dr. Montgomerie, who had the advantage of him in working from a prepared script. He went on to say that his job seemed less clear cut, but he hoped it would not be presumptuous to assume that from the treatment of his subject Dr. Lovell appeared to have intended to allow the practical aspects of the subject to develop by discussion. Perhaps this would be his (Dr. Brownlee's) best approach. It might be he could interpret his mandate best by making the meeting do as much of the discussion for itself as was possible. There must be present, for example, many members with special knowledge.

It would seem that economics limited the systemic use of penicillin in the large animal, but this did not seem to be so for small animals. Local application in all animals appeared to be a well-established practice. While there was substantial agreement about the pathologies susceptible to penicillin therapy, much was still to be learned about routes of administration. Dr. Brownlee then mentioned the various preparations of penicillin in general use, the methods of administration and the routes of absorption, and noted briefly that while in the intact blood-brain barrier penicillin did not penetrate to the C.S.F., in meningitis it appeared to do so and the damage caused by the disease was probably responsible. It was also notable that penicillin did not pass the mammary milk-blood barrier. He dealt in some detail with the use of the so-called "depot" substance (beeswax and arachis oil) which was intended to give a slower rate of absorption and therefore to require less frequent dosage, but opinion was now sceptical of the advantage of this preparation. Penicillin in normal saline solution appeared to give as good blood levels as the oily vehicle. With regard to the agalactiae mastitis in cows, Dr. Brownlee expressed interest in the statement that the efficiency of penicillin was in inverse ratio to the quantity of ultimate diluent in the udder. If this were so then the logical method of treatment would be to apply the penicillin in the udder in solid form, or as near solid as it could be introduced. He wished to know the opinion of members on the best method of using penicillin in cases of mastitis and he also wanted to hear the opinions of practitioners who had used penicillin in the field.

Mr. Hignett thanked Dr. Lovell for the trouble he had taken to prepare the paper, which had been so ably delivered by Dr. Montgomerie, and he thanked Dr. Brownlee for coming there that day and for opening the discussion. Mr. Hignett went on to say that he had been associated with a great deal of work on the treatment of cattle affected with mastitis caused by *S. agalactiae*. Various schemes of dosage and various vehicles for penicillin had been used. Quite early in the investigation it had transpired that intravenous, intramuscular and subcutaneous administration of the drug in cases of mastitis were quite useless as the drug did not penetrate to the mammary tissue. The only method of getting the penicillin in contact with the causal organism was by intramammary infusion *via* the teat canal. Various quantities of penicillin in various vehicles had been used and good results had been obtained by using 10,000 units in 50 c.c. of sterile distilled water given twice daily for two days; 20,000 units given twice daily for two days; and 20,000 units given once daily for two days. The method of choice for the practitioner appeared to be the last, namely, 20,000 units given once daily for two days. Experiments had also been made by using the penicillin in beeswax and arachis oil given by intramammary infusion—20,000 units in 1½ c.c. of the vehicle had been employed and the results had been encouraging. The advantage of using this oily vehicle was that one obtained a high concentration of the drug in the gland and it persisted for a longer period. Mr. Hignett remarked on the poor results obtained in the treatment of mastitis due to *Corynebacterium pyogenes*. This lack of response was difficult to understand. The results obtained in the treatment of staphylococcal mastitis were more favourable—40 to 50 per cent. of cases were cured with penicillin.

Mr. Pasfield said that Dr. Lovell's paper contained so much information that he felt somewhat diffident about commenting on it at such short notice. He feared that in time preparations of penicillin would be on sale at all chemists and druggists and the farmer would be using them indiscriminately on all cases without consulting the veterinary surgeon. He had found by experiment that 50,000 units of penicillin dissolved in 5 c.c. of sterile water gave the best results in the treatment of *S. agalactiae* mastitis, but he had not had good results in cases of cows which were drying off. He would like to learn more about the difficulty of penetrating the blood barrier with penicillin and other drugs. Could Dr. Brownlee inform him how and why staphylococcus toxoid worked? In his view such good results were obtained in the treatment of swine erysipelas with the specific serum that penicillin did not appear to be indicated in the treatment of this condition. The difference of cost was also a matter of some importance. He had obtained excellent results in the treatment of foul of the foot in cattle with penicillin. The affected parts had been thoroughly cleansed and opened up and then dressed with 50,000 units of penicillin applied on a dressing every 48 hours.

Dr. Brownlee sympathized with Mr. Pasfield in his fear for the indiscriminate use of preparations containing penicillin. They all hoped that the Bill now before Parliament would adequately prevent this danger as it was being definitely laid down that penicillin would be available only on the prescription of a qualified practitioner. The danger of using penicillin indiscriminately was, of course, that resistant strains might be produced by inadequate dosage. He thought this potential danger had been magnified as he had not yet come across a naturally produced resistant strain of organism which was normally penicillin-sensitive, but in common with most workers he had bred resistant strains in the laboratory. This character was, however, soon lost unless artificially maintained. There was the danger that a penicillin-resistant strain might be produced on a particular farm by prolonged inadequate dosage. Regarding the mammary- and blood-brain-barriers, Dr. Brownlee suggested that penetration of these membranes appeared to be a question of molecular shape, and to a less extent, size. It was an interesting fact that substances which did not normally penetrate these barriers did so when they were injured or damaged by some disease. Dr. Brownlee agreed that in pigs the best and cheapest method of treatment of swine erysipelas was by serum but in man penicillin appeared to give good results. He was most interested to hear of the treatment of foul of the foot with penicillin.

Dr. Montgomerie remarked that he disliked the idea of injecting, by the subcutaneous and intramuscular routes, oily substances into animals. The oily vehicle was a foreign substance and could give rise to trouble, but he did not object to the infusion of an oily substance into the udder as it did not give rise to any reaction. The position was not comparable with the use of stilboestrol in oil as with this substance the oil was essential as the drug was not soluble in water. As had been remarked, when penicillin was in contact with water there was rapid deterioration and its activity was maintained for a longer period when dissolved in oil. The chief aim in the treatment of mastitis was to reduce the level of contamination on farms. Everything in the byre was contaminated with the causal organisms which could live for a time outside the animal body but could not multiply, but they did so in the udder and in wounds. Therefore the weak link in the development of the organisms was when they were in the animal and this was where they should be attacked and destroyed. Naturally the disinfection of milking and other utensils should be carried out at the same time. Dr. Montgomerie confessed that he could not explain why staphylococcal toxoid worked. In theory this treatment was not logical but the fact was that in practice it worked. He thought that the use of penicillin in small-animal practice required the evolvement of a satisfactory method of administering the drug by the mouth. At present this method of administration was under investigation.

Miss Ferguson said that she had used penicillin in the treatment of a number of cases in small animals. In a case of post-distemper pneumonia she had given an initial dose of 50,000 units by intra-thoracic injection and had followed this up with 25,000 units at intervals of 24 hours. She had also used penicillin with most satisfactory results in cases of ieptospiral jaundice in the dog; in the general treatment of abscesses; instilled into the nostril in cases of catarrh in the cat, and in aural conditions.

Dr. Brownlee remarked that a number of observers had found that Gram-negative organisms in open wounds quickly inactivated the penicillin. Otherwise the cream was a useful dressing but it was most essential that it should be fresh. There seemed to be a future for the oral administration of penicillin in small-animal practice.

Mr. Shand said that there had been some reports of penicillin producing painful lesions with ulceration when used locally in the mouth. He wished to know if there were any dangers in prolonged application in other sites and what was the nature of the reaction? Did the reaction which sometimes occurred during the local treatment of the cow's udder represent a similar process?

Dr. Brownlee replied that the only toxic action which was known to be due to the chemical substance was that seen on the iris. "Black tongue" was under investigation and had been shown to be associated with nicotinamide deficiency, but judgment was reserved. We had to keep in mind the capacity of this, and similar antibiotics to modify the normal, mixed flora of body cavities. In the knowledge of the biosynthesis of growth factors due to these micro-organisms it would not be surprising if new pathologies were uncovered in this way.

Mr. Hignett remarked that when penicillin was used on cows affected with mastitis which were giving less than a gallon of milk a day there was a local reaction. He did not consider that this was due to irritation caused by the penicillin but was probably due to an alteration in the pH of the milk.

Mr. Pasfield wished to know if Mr. Hignett would advise against the use of penicillin in the drying-off cow?

Mr. Hignett replied that he would definitely not do so as the reaction was neither serious nor harmful. He went on to remark that in some of the older methods of treating mastitis the benefit obtained was probably due to the irritation set up.

Mr. Peace said that it had been his practice to treat with penicillin all cows which had been affected with mastitis when they were drying off. He had treated some hundreds and had never had any complaints nor seen any reaction worth recording. He gave details of a dog with a very badly lacerated thigh, which was practically *in extremis* when treatment with penicillin by systemic injection only was started, which made a most spectacular recovery. The dose employed was 50,000 units at four-hourly intervals for 24 hours carried on continuously.

Mr. Scott Dunn related his experience in the use of penicillin in small-animal practice and said that he was looking forward to the day when the continuation treatment could be given by the mouth. He wished to know if penicillin was of any use in the treatment of diarrhoea in dogs. He remarked that people expected too much and they thought that penicillin was a cure for all evils.

Major Lawrence said that he had used penicillin on several cases in small animals and had had excellent results when the causal organism was penicillin-sensitive. It seemed to him that the difficulty the small-animal practitioner was up against in using penicillin was that it had to be used empirically. It was neither practical nor economic to have a bacteriological examination carried out to ascertain if the responsible organism was or was not sensitive to penicillin. His practice had been to use the drug and if the case responded he continued with it, but if there was no improvement in a reasonable time then a change was made to other remedies. He remarked that excellent results had been obtained in cases of jaundice in dogs and also in cases which had had violent bloodstained diarrhoea and which appeared to be developing into Stuttgart disease. He remarked that he had had some rather alarming local reactions after injecting the oily solution. He understood that this preparation was not now so popular with medical practitioners because of the reaction to which it gave rise and also because it was painful and the pain persisted for a long time.

Mr. Willett wished to know how long solutions of penicillin could be kept and if it was essential that they should be kept in the ice chest?

Dr. Brownlee would not commit himself to a definite statement on this point, contenting himself by repeating that penicillin deteriorated rapidly in contact with water and that only fresh solutions should be used.

Weekly Wisdom

The order we now seek must spring from a recovered vision and not be imposed from outside.—Basil Willey.

Penicillin Treatment for Mastitis in Dairy Cows*

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In this country and in every country in the world where dairy farming is practised, chronic mastitis due to *Str. agalactiae* is the cause of an enormous loss to the dairy industry. Statistics are often uninteresting but we cannot afford to ignore the fact that it has been estimated that 25 per cent. of the cows in our herds are suffering from latent or sub-clinical mastitis and that millions of gallons of milk are lost annually due to the disease.

Penicillin has been found effective in the treatment of about 80 per cent. of cows which are infected with inflammation of the udder due to *Str. agalactiae*. The rational extension of the use of penicillin in veterinary practice should greatly reduce the loss which has resulted in the past, and our profession has a valuable weapon for combating the disease in the use of penicillin.

Although penicillin was discovered by Fleming, a British scientist, and developed by Florey, another British scientist, there was a considerable lag before supplies became available for the drug to be used upon farm animals in this country. In 1942, I was fortunate in being able to obtain a small quantity of penicillin and had the opportunity of trying it upon dairy cows for experimental purposes. The drug was used intravenously, subcutaneously, intramuscularly and by udder infusion, and by the last method of administration upon a cow which was suffering from mastitis due to *Str. agalactiae* and which had proved resistant to sulphanilamide therapy, the treatment proved successful in rendering the milk free of organisms from the infected quarter.

It was seen that cattle tolerated the drug well in all forms of administration and it was disappointing that supplies of the drug were then unavailable for more extensive use upon animals.

Towards the end of 1944, a limited amount of penicillin became available for research purposes and at Thurgarton we were able to treat a series of cows with penicillin in the years 1945 and 1946.

Penicillin in the form of a dry powder was obtained and stored in a refrigerator at a temperature of about 45° F. Just prior to use, the powder was dissolved in sterile distilled water or physiological saline solution. In these early experiments, the calcium salt of penicillin was used in physiological saline, and in the later series the sodium salt was used in sterile distilled water.

It is quite evident that the treatment of individual cows suffering from mastitis does little to eliminate the disease in a herd. Mastitis is a herd problem and its successful control depends upon the management and co-operation of the owner, the herdsman, the veterinary surgeon and the research investigator.

A clinical case is often the end point of a long-standing infection and disappointment is likely to result from the use of intramammary infusion with penicillin in some chronic mastitis cases of long standing with fibrosis of the udder tissue and the presence of inaccessible foci in the gland.

In our work at Thurgarton we found that 20 per cent. of the cows suffering from streptococcal mastitis failed to respond to penicillin infusions and much work still remains to be done before we can recommend a line of treatment for these cows with complete confidence.

Intermittent Treatment

The method adopted was to infuse the udder with 30,000 units of penicillin in each quarter of the gland on two successive days, to omit treatment for two days, to continue treatment with penicillin for two days, omit treatment for two days and treat for two days. In persistent cases this method has given some hope of success.

It is well known that mastitis in cows may be caused by a variety of organisms and that the most common form of contagious mastitis is caused by *Str. agalactiae*. At Thurgarton we have been able to treat successfully 80 per cent. of cows whose udders were infected with these organisms and I propose to describe the method we now recommend.

Method of Treatment

Penicillin is marketed as the sodium or calcium salt and the standard phial of 100,000 is the dose most often used. This should be stored at a temperature of 45° F. in a refrigerator.

For giving udder infusions the following equipment is required:—

(*a*) 1 × 50 c.c. sterile syringe.
(*b*) Four sterile teat syphons with rubber and glass fittings.
(*c*) Phial of 100,000 units of penicillin.
(*d*) 200 c.c. of sterile distilled water.
(*e*) Methylated spirit.
(*f*) Cotton wool swabs in sterile bottle.
(*g*) Four sterile sampling bottles, labelled.
(*h*) One pair rubber gloves.
(*i*) Bottle of disinfectant.
(*j*) Udder Cloth.
(*k*) Soap, hand bowl and towel.

The apparatus is prepared in the following way:—

The syringe is taken apart and placed in cold water, which is brought to the boil and kept boiling for 20 minutes. It should then be fitted together aseptically and placed in a sterile container or the nozzle covered by means of a sterile test-tube.

Each teat syphon is fitted with a short piece of rubber tubing at the mount. Into this is inserted a small piece of glass tubing to which is added another short piece of rubber tubing. It may be necessary to have these two pieces of rubber tubing of a different bore, as one fits on to the mount of the syphon and the other on to the nozzle of the syringe. If necessary, the piece of glass tubing may be tapered by heating over a bunsen flame to obtain the required bore. Each teat syphon is fitted up in this manner, in sets of four, and sterilized by boiling for 20 minutes. They should then be placed in a large sterile glass tube which is stoppered with sterile cotton wool to exclude the air.

The distilled water (200 c.c.) should be put into a screw-capped bottle and boiled in a water bath for one hour.

The penicillin should be made up into a solution by adding 10 to 15 c.c. of sterile distilled water, in the following manner:—

The metal cap is removed from the phial and the rubber stopper swabbed with methylated spirit, 10 to 15 c.c. of distilled water is withdrawn from the bottle containing 200 c.c. and injected into the phial by puncturing the rubber with the syringe needle. When the penicillin is dissolved the contents of the phial should be withdrawn by means of the syringe and injected into the remainder of the 200 c.c. of distilled water in the screw-capped bottle. This solution 200 c.c. distilled water plus the penicillin, constitutes the fluid to be infused.

The technique of infusion is as follows:—

The rubber gloves are donned and the udder washed with warm soapy water and dried. After this the gloved hands are cleansed by washing in dilute antiseptic solution in the bowl. The teats should next be swabbed with sterile cotton wool soaked in methylated spirit. A sample of milk from each quarter is then milked into the sterile sample bottles, which have previously been marked with the name of the cow, quarter and date.

Next the 50 c.c. syringe is fitted with one of the teat syphon fittings, filled with penicillin solution and the quarter infused. The rubber-glass-rubber connection acts as a canal between the syringe and the teat syphon, with the following advantages:—

The rigidity of a straight teat syphon plus syringe fitting is avoided and the glass portion enables the manipulator to observe any back flow which may take place towards the end of the infusion. Should such a back flow occur, the rubber tubing nearest the syringe should be pinched to prevent contamination of the syringe, and the possibility of carrying infection from one quarter to another.

This procedure is repeated for each of the four quarters, using a fresh teat syphon fitting for each quarter.

When all quarters have been infused the udder should be massaged to assist penetration of penicillin.

* * * *

Mastitis due to *Str. uberis* and *Str. dysgalactiae* may be successfully treated with penicillin intramammary infusion with 25,000 to 30,000 units in 50 to 100 c.c. of distilled water in each quarter of the udder on two successive days, with an interval of 24 hours between dosage in most cases. It can be stated that streptococcal mastitis responds to treatment with penicillin in a high proportion of cases and the drug is practically non-toxic and does not seriously interfere with the milk yield of the cow.

Mastitis due to *C. pyogenes* (summer mastitis) has been treated with penicillin in varying doses, but has failed to effect any marked improvement in the local inflammation of the mammary gland. It is, however, considered that intensive penicillin therapy may have been of value in combating the general systemic effects of the local udder infection. (Downham, K. D., Christie, G. J., & Hughes, D. I.) [*Vet. Rec.* May 17th, 1947. **59.** 237.—*Editor.*]

The possibility of a filtrable virus being the cause of mastitis is discussed by Baker, J. A., & Little, R. B., and there is a publication at present in press, "Bovine Mastitis, A Symposium," by Little, R. B., & Plastridge, W. N. [*Vet. Rec.* June 7th, 1947. **59.** 282.—*Editor.*]

The following is a summary of the First Report of the Intramammary Therapy of Bovine Mastitis—Report No. 5, which

* Presented to the Yorkshire Division, N.V.M.A., at Leeds, February 28th, 1947.

appeared in the *Journal of the American Veterinary Medical Association* in March, 1946:

THERAPY OF BOVINE MASTITIS

Infectious mastitis is a problem of the herd and not just one which concerns the individual cow, and where it is prevalent it indicates that sanitation, environmental conditions and supervision have been slack. The management of the herd should therefore be adjusted to control and prevent the spread of infection.

Bacteriological tests on quarterly samples from each cow show the degree of infection and the cows should be grouped according to these results, for subsequent milkings. Cows free from infection should be milked first, mild and early cases of infection following, while chronic and advanced mastitis cows should be segregated and milked in another shed where possible, or at the end of the milking line. These measures must be strictly adopted and the herd re-tested at intervals of 30 to 90 days until clear from infection.

Before, during and after treatment bacteriological tests should be used to determine the nature of infection present and the subsequent efficiency of the cure. Clinical observations alone are not to be relied upon as changes in the milk may be due to other things, such as any previous sickness (other than mastitis) and hormonal infection. Treatment should be carried on, based on the laboratory results, without waiting for clinical symptoms to appear. Delay may cause serious damage to the secretory tissues and the chances of cure are reduced. Even though the cow may appear to be cured, it would be a danger to, and a source of infection for, the other cows in the herd.

Experience has shown that the best results can be obtained from intramammary infusions administered in late lactation or during the dry period. This is due to the fact that the infected tissues are more concentrated together as the gland shrinks, the active agent is allowed to remain in the udder for a longer period of time and it is not diluted by the milk secretion.

After treatment the lower portion of the udder should be massaged, regardless of the amount infused, to facilitate distribution throughout the udder.

When treatment is given to a lactating cow, repeated injections may be necessary to produce a cure. If there is no response after a reasonable number of infusions, further treatment should be discontinued until the dry period, as administrations may excite the already irritated gland, resulting in an acute attack of mastitis. The cow should be kept on a low-production diet to rest the udder and hand milking practised so that unfavourable changes in the udder and milk can be observed more closely.

When treatment has been given, the first milking must be discarded altogether and any subsequent milking when the fore milk appears abnormal.

It must be stressed here that it is possible to convey infection through the whole herd by using the same apparatus for each cow, and therefore special precautions need to be taken to eliminate this risk.

The efficiency of the treatment, and the percentage of cures depends entirely upon (*a*) the correct diagnosis, (*b*) careful and efficient treatment, and (*c*) proper herd management. Lightly infected udders respond quicker to treatment than chronic cases, and as treatment is expensive, cows with badly damaged udders which are poor producers should be eliminated from the herd and sold for slaughter. This will raise the possibility of a higher percentage cure in the herd as the incurable cow would always be a source of infection to the others, which, even after having been cured, will always be susceptible to reinfection.

A cow is not considered cured and clear from disease until the disease-producing bacteria have been completely eliminated from the milk and bacteriological tests give negative results over a period of two to three months.

Because bovine mastitis involves the whole herd and not merely a single cow it will easily be seen that a method of preventing spread is more important than relying on a medicative cure for the whole herd.

VETERINARY SURGEONS AS LECTURERS FOR U.F.A.W.

We learn that the Universities Federation for Animal Welfare, 284, Regent's Park Road, Finchley, N.3, is building up a panel of speakers and would be glad to know of any veterinary surgeons who would be willing to give an occasional talk. Volunteers are asked to write to U.F.A.W. stating their locality, the days and times when they might be available, the subjects offered, whether a juvenile or adult audience is preferred, and whether fees or expenses would be charged.

U.F.A.W. will then put veterinary surgeons in touch with suitable audiences.

The Action of Penicillin in vitro on Various Bacteria of Animal Origin

By

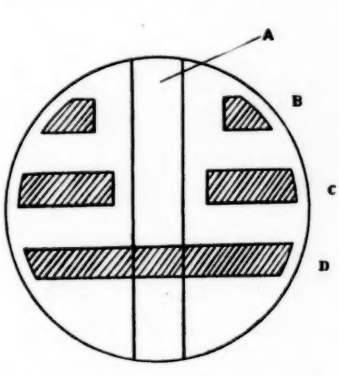
ISOBEL W. JENNINGS

LATE OF THE DEPARTMENT OF VETERINARY PATHOLOGY, LIVERPOOL UNIVERSITY

Now that penicillin is more readily available for use in animal practice, it may be of interest to practitioners to know which infections are likely to respond to penicillin treatment.

The simplest method of detecting susceptibility is one in which the freshly isolated organism is grown on a blood agar plate, across which runs a ditch of medium containing a certain concentration of penicillin. The penicillin-resistant organisms will grow across the ditch, and sensitive strains will not grow either on the ditch, or within some millimetres of it. The technique is not complicated. It involves the preparation of a blood agar plate in the usual manner—in this investigation nutrient agar with 5 per cent. oxalated horse blood was used. When the medium had solidified, a ditch, approximately one centimetre in width, was cut right across the plate. This ditch was filled with horse blood agar containing penicillin in solution In practice, three plates were always used for testing each organism. The material for the penicillin ditches was composed of 8·5 ml. nutrient agar, 0·5 ml. oxalated blood and 1·0 ml. of a penicillin solution. The latter solution contained 1,000, 100 or 10 units of penicillin per millilitre. This gave a final concentration of 100, 10, and 1 unit per ml. of medium in each of the three ditches. Prepared blood agar ditch plates were stored overnight in the refrigerator before use.

The following diagram will explain the method of testing the organisms.



(*a*) Penicillin blood agar ditch containing 1, 10 or 100 units of penicillin per ml.
(*b*) Growth of penicillin-sensitive organism.
(*c*) Growth of standard strain of staphylococcus for comparison.
(*d*) Growth of penicillin-resistant organism.

The plates were heavily inoculated with a pure culture of the Oxford strain of *Staphylococcus aureus* right across the middle, at right angles to the ditch. On either side, pure cultures of organisms under test were streaked across the plate. In this way, two or even four separate organisms could be tested on a single set of plates.

After incubation under suitable conditions, the susceptibility or otherwise of the organisms was gauged roughly by measuring the distance between the ditch and the growth which appeared, and comparing it with the growth of the Oxford staphylococcus. In this way it was possible to find out fairly rapidly whether a particular disease was likely to react favourably to penicillin therapy.

In the course of routine diagnosis, 43 separate strains of animal pathogens—a fairly representative collection of the common disease germs in this district—have been tested in this manner and the organisms have been divided into four groups according to susceptibility. They have been classified as highly, moderately and slightly susceptible, and insusceptible.

HIGHLY SUSCEPTIBLE GROUP

This group contains those organisms which, in their susceptibility, equal or surpass the sensitivity of the standard Oxford strain of *Staphylococcus aureus*. This strain was grown for comparative

purposes on every plate used. Two strains of *Staph. aureus*, one from a case of bovine staphylococcal mastitis, and the other a non-haemolytic strain from apparently normal bovine milk, fall into this group. High up in the group, too, come four strains of *Corynebacterium pyogenes* obtained from cases of summer mastitis, one from a case of traumatic bovine pericarditis, and one which was found in the udder secretion of a dry heifer, but which was not apparently causing any trouble.

One strain of *Streptococcus agalactiae* (bovine mastitis) came into this group, as also did a strain of Group G streptococcus, isolated from a bulldog pup, dead of streptococcal septicaemia.

Two strains of *Erysipelothrix rhusiopathiae*, one from a porcine endocarditis, and one from a case of duck septicaemia were highly susceptible. (The latter strain, unfortunately, gave rise to a case of human erysipeloid, which, however, responded rapidly to parenteral injections of large amounts of penicillin.)

One strain each of *Actinomyces bovis*, *Clostridium welchii B* and *Cl. chauvoei*, although not freshly isolated, were tested and found to be strongly inhibited by penicillin.

Moderately Susceptible Group

In this section, the following organisms were placed:—

Two strains of *C. pyogenes* causing bovine mastitis, and one causing bovine pyometra.

Staph. aureus from an abscess in the saddle region of a gelding.

A Group C streptococcus from a case of feline metritis. This animal aborted as a result of the infection. Sections of the uterus showed evidence of acute metritis, with invasion by the streptococci.

β-haemolytic streptococci from (*a*) a case of fistulous withers, (*b*) enzootic mastitis in a herd of cattle, and (*c*) from the tonsils of a dog suspected of being a carrier of pathogenic streptococci.

Three strains of *Str. agalactiae*, two being from cases of chronic bovine mastitis, and one from a case of acute mastitis.

One strain of *Str. dysgalactiae* from a case of acute bovine mastitis.

Bacillus anthracis isolated from a cow dead of anthrax.

Slightly Susceptible Group

This group includes those organisms which were only slightly inhibited by penicillin, even in high concentration. Penicillin therapy would not be indicated in such infections.

Staph. aureus is represented in the group by a β-haemolytic strain, which was isolated from a case of bovine mastitis along with *Str. agalactiae.*

Also included in the group is a strain of *Str. dysgalactiae* which was found causing a disease clinically indistinguishable from summer mastitis. The udder secretion resembled that found in gross *C. pyogenes* infection. Other streptococci included a strain of *Str. agalactiae* from a case of bovine mastitis, an unidentified *β-haemolytic streptococcus* from canine tonsils, and a culture of *C. pyogenes* isolated from an inflamed bovine uterus. (A strain of *C. ovis* from the National Collection of Type Cultures falls into this group.)

It was not to be expected that a Gram-negative organism like *Pasteurella septica* would be inhibited by penicillin, but two freshly isolated strains were inhibited by concentrations of 100 and 10 units of penicillin, although they grew right across the ditch containing 1 unit per ml. These strains were isolated from a case of swine plague, and from a case of pneumonia and pleurisy in a lion cub.

Insusceptible Group

This group, composed of Gram-negative organisms entirely, included those organisms which grew right across the penicillin blood agar in all three concentrations. The following organisms fell into this group:—

Vibrio foetus.

Brucella abortus, one strain of bovine origin and another isolated from equine fistulous withers.

Three strains of *Salmonella pullorum* from chicks dead of bacillary white diarrhoea.

Bacterium coli (var *acidi lactici*). The presence of large numbers of these organisms in leucocytes in direct milk smears left no doubt as to their pathogenic nature in a case of bovine mastitis.

From the foregoing, it will be evident that strains of a given organism vary greatly in their susceptibility to penicillin. For example, there are strains of *Str. agalactiae* and *C. pyogenes* which are highly resistant to the action of penicillin, just as there are strains which are highly susceptible. A simple laboratory test will distinguish these, so that time will not be wasted in treating an animal harbouring a penicillin-resistant strain.

It does not of course follow that if a strain is susceptible to penicillin *in vitro*, it will be susceptible *in vivo*. Much will depend on the pathogenesis of the disease; for example, *Actinomyces bovis* and *Ery. rhusiopathiae* in some cases, although highly susceptible to penicillin *in vitro*, may not be accessible to the drug in the animal body, as a result of their protection by dense layers of fibrous tissue or necrotic material. A high local concentration of the drug is required before it can exert its maximum effect. And again, in those infections characterized by heavy toxin production, such as the clostridial and corynebacterial diseases, penicillin therapy will have to be supplemented by antitoxic measures, since the drug is antibacterial only, not antitoxic.

CLINICAL COMMUNICATION

An Outbreak of Lead Poisoning*

G. N. SHIRLEY, B.V.SC., M.R.C.V.S.
Crewe

Symptoms: A group of five yearlings at grass began to show symptoms of anorexia and dullness. One died the following day in convulsions, two died three days later, one was sold and one recovered. All showed the same general symptoms which were dullness, anorexia, inco-ordination, apparent blindness, grinding of the teeth (which was very marked), frothing at the mouth and convulsive fits. None had a temperature except during a fit, and the highest temperature recorded was 104° F. Two of the animals which died became completely frenzied before death.

Post-mortem Finding: A *post-mortem* examination was carried out within a few hours of death on one of the animals which died after three days' illness.

Gums: no blue line.

Heart, lungs and associated glands: normal.

Rumen and reticulum: large amount of green fermenting material; no foreign bodies were found.

Omasum: impacted and very hard, containing dark green compressed food and small flat pieces of soft blue-grey material.

Abomasum: contained green fluid material and a handful of blue-grey lumps and granules up to 1 cm. in diameter. These could readily be crushed and smelt of paint. Following extraction with a mixture of hydrochloric and nitric acids, and the addition of potassium iodide solution, yellow crystals of lead iodide were formed which, after boiling and cooling, gave typical iridescent scales.

Mucosa of small and large intestine: intense irregular congestion.

Rectum: a few red streaks on mucosa; hard, dark green, mucus-covered faeces.

Mesenteric glands: not swollen and oedematous as one would expect if there were an acute infection.

Liver and kidneys: no significant changes.

Bile and urine: amber, the former being very dark.

Adrenals: small haemorrhages.

Cultures from heart-blood, spleen and mesenteric glands were all negative.

Both carpo-metacarpal joints of the second animal which died were examined 24 hours after death. They were a very marked purplish-blue colour, totally unlike a normal joint.

Treatment: In the animal which recovered, treatment consisted of white of egg several times daily, potassium iodide three times daily, followed by magnesium sulphate two hours after each dose of potassium iodide. The symptoms began to abate about 36 hours after treatment was commenced and disappeared in the following order: First the eyesight became more normal and the animal was obviously aware of one's presence. Next the grinding of the teeth went and there was less inco-ordination in motion. There was then a return of appetite and an attempt to nibble some grass, although it was necessary to bottle feed for three days. It is perhaps noteworthy that the bowels never completely stopped functioning in this animal.

Remarks: The owner had originally denied that there was any possible access to paint but after the *post-mortem* examination, several old tins of paint were found in a shallow pit. It was then ascertained that some children had disturbed these old paint pots just prior to the outbreak and had scraped out some of the old paint and scattered it on the ground. It was for this reason that the animals all became affected at once.

*I am indebted to Mr. J. Francis, B.SC., M.R.C.V.S., who carried out the *post-mortem* examination. This was done because the farmer insisted that there was no access to lead and an acute septicaemic condition was suspected.

ABSTRACTS

[**A Virus Causing Abnormal Milk in Cattle.** Baker, J. A., & Little, L. B. (1946.) *Proc. Soc. exp. Biol., N.Y.* **63**. 406.]

Dairy cows near Princeton, N.J., showed an unusually high incidence of clotted milk containing blood during the spring, summer and fall of 1946. The majority of cases occurred in the latter part of May and in June, and animals in all stages of lactation were affected. Many specimens of abnormal milk contained flakes composed of polynuclear and mononuclear leucocytes. Affected animals frequently showed temperatures exceeding 40° C., but otherwise appeared normal and continued to eat as usual, while symptoms usually disappeared in two to four days.

The authors found that by injecting guinea-pigs with freshly drawn milk from affected cows, a temperature reaction was caused and this could be maintained by serial passage; it was possible also to demonstrate immunity in recovered guinea-pigs. The same thermal response was elicited in cows and rabbits, while the infective agent could be maintained for one passage on the chorio-allantoic membrane of incubated eggs. The authors conclude from their investigation that a virus is responsible for the abnormal condition observed in the milk of dairy cattle.

S. J. E.

* * * * *

[**I—Absorption of Distemper Virus on Aluminium Hydroxide; II—The Action on the Mixture of Drying After Freezing.** [Trans. title.] Goret, P. (1946.) *Ann. Inst. Pasteur.* **72**. 53-57.]

I. The author describes the experimental results obtained when the virus of distemper was absorbed by aluminium hydroxide.

A virus infective to dogs and adapted to ferrets (by 12 to 18 passages) was used in the experiment The source of infective material was the spleen of an infected ferret, although it was found to be equally possible to use brain material.

After removal, the infected spleen was weighed, ground up and mixed with distilled water, the final mixture containing 160 mgm. of tissue per c.c. of solution. After being centrifuged the supernatant fluid was filtered through a Seitz K2 filter and dilutions of it corresponding respectively to 20, 40 and 80 mgm. of infected tissue per c.c. were prepared. These quantities would represent several thousands or tens of thousands of minimal lethal doses for the ferret, as the ferret is susceptible to the subcutaneous inoculation of a thousandth of a milligramme of virulent tissue. To absorb the virus equal quantities of the suspensions of virulent material and aluminium hydroxide were mixed and shaken by hand.

The solutions were injected into susceptible ferrets, and it was found that amongst the eight ferrets inoculated the only ones to develop distemper were those which received the quantity of virus corresponding to 80 mgm. virulent tissue.

The author concludes that distemper virus is readily and rapidly absorbed by aluminium hydroxide, and that the mixture is fixed in its virulence for ferrets.

II. The above mixtures after freezing were desiccated, following the technique of Flosdorf & Mudd. Goret found that the desiccated absorbed virus conferred a solid immunity against distemper in ferrets.

In conclusion the author suggests that there is a close union between the colloidal particles and the elements of the virus, resulting in a stable mixture; or that there is actually a physico-chemical modification of the virus-aluminium mixture. The desiccated mixture is both avirulent and immunizing. He suggests, therefore, that this virus modification might be tried with equal success on other viruses.

G. C. B.

ASSOCIATION OF AGRICULTURE

The resignation of Lord De La Warr from the office of president of the Association of Agriculture has been announced by headquarters of the Association. He is to be succeeded by the Duke of Beaufort. Lord De La Warr, intimating his desire to retire, said he had held the office since the Association's formation. He felt it would be desirable to establish the principle that, in view of the Association's recent incorporation and establishment upon a firm basis, the presidency should not develop into a permanent appointment. As a past-president, Lord De La Warr remains *ex officio* a member of the Council and Executive Committee. The Association's Council has agreed that the office of president should in future be held for one year only, with a possible extension of one further year.

REVIEW

["**Hints for Young Riders**": Written and illustrated by Major-General Geoffrey White, C.B., C.M.G., D.S.O. Published by the National Horse Association of Great Britain. Price 4s.]

The writer of these notes having been Superintendent of the Riding Establishment, R.A., Woolwich, is so well equipped for his task that his views on riding at large must be accepted as authoritative and are likely to prove of considerable practical value to all young riders.

The illustrations, drawn by the author himself, aptly illustrate the points he wishes to emphasize and are followed by some brief advice on hunting, the purchase of a hunter and hunting kit.

Although the books dealing with the art of riding are legion, this addition to their number by a distinguished soldier who obviously is a master of his subject, is likely to be welcomed and it is one which cannot fail to be of interest to young riders anxious to be set upon the right path.

ROYAL COLLEGE OF VETERINARY SURGEONS

Membership Examinations, July, 1947

List of Successful Candidates

(*Concluded*)

Edinburgh

First Examination:

Adamson, I. W.
Barr, Macleod
Brown, T. C.
*Burrows, Robert
Butcher, Miss J. P.
*Campbell, E. A.
Campbell, Kenneth
*Caufield, William
Clark, Miss S. T. (B)
Crawford, Miss H. F.
Davies, J. C.
Duguid, H. I.
Earnshaw, D. G. (C)
Evans, T. D. (C)
Falconer, John (C)
Fraser, Gordon (C)
*Gilling, G. H. C.
*Gitter, Maurycy
*Gruchy, C. L.
Hall, Miss E. K. M. (C)
*Hallam, C. W.
Huck, R. A.
Jackson, O. F.
Macaulay, Malcolm
McCallum, Gordon
Mackay, J. M. K.
MacLennan, Walter
Martin, R. D.
Mitchell, Miss H. M.
Morris, Miss E. K. (C)
Morton, K. E. (C)
Munro, John (C)
Newsam, I. D. B.
Owen-Pawson, D. D.
Penman, J. H. (C)
Philp, G. I. (C)
Plummer, G. A.
Rankin, J. E. F. (C)
Rashid, A.
Scrivens, G. W. (C)
Skowronski, Z. J. K.
Sloan, W. H. (C)
Smith, A. G.
Thompson, B. R.
Trought, V. P. T.
Young, D. W.

* denotes 2nd class honours.
(C) denotes credit in Chemistry.
(B) denotes credit in Biology.

Second Examination:

Argo, Edward
Ash, R. W.
Baxter, J. T.
Brown, A. J.
Butler, M. C. (H)
Christie, Gordon (P)
*Clegg, F. G.
Coid, C. R.
Cooke, C. D.
Cragg, D. A. (H)
*Crighton, W. G.
Dean, T. S.
Fraser, L. D.
Gellatly, J. B. M. (H)
Gibson, W. W. C. (H)
*Gittins, J. M.
Glover, T. D. (H)
Hardie, Henry
Hare, W. C. D.
Harrison, K. S.
Henderson, G. M.
Hooper, R. B.
Jennings, Miss A. H.
Jones, E. J.
*Lancaster, M. C.
Logsdon, Miss S. E.
McFadyen, C. A.
McLaren, Lyndon (P)
McLaughlan, John
Magowan, J. W.
Marr, T. G.
*Martin, Harold
Murchie, Kenneth (H)
Murchie, William (H)
Nadin, J. B. (H)
Parkes, W. D. C.
*Peacock, J. M.
Robson, G. L.
Ross, J. P.
*Scoggins, P. G.
Sharp, W. F.
Shortridge, E. H. (P)
Sojka, Witold
Sutherland, F. R.
Tarata, Jan
*Thompson, P. K.
Turton, I. D. (H)
Vicary, R. W. G.
Wight, Graham
Willder, A. G.

* denotes 2nd class honours.
(P) denotes credit in Physiology.
(H) denotes credit in Histology.

THIRD EXAMINATION:

Anstruther, Miss J. D.
Ashworth, G. H. S. (A) & (H)
Baker, F. C.
Brooks, C. R. (A)
Brown, C. W.
Burns, K. N.
Chestnut, Andrew (H)
Dick, G. H.
Davidson, Ian (A) & (H)
Drake, J. N.
Edgar, D. G.
Evans, G. J.
Fairweather, Alexander (A) & (H)
Field, John
Finlay, R. A.
Geddes, William
Gibb, Alexander
Gibbs, J. R.
*Hayes, G. E.
Husakiewicz, Emil
Jones, Roger
Lindley, E. P. (A) & (H)
McCully, W. H.
McFarlane, D. F.
Malone, G. S. R.
Miller, M. W.
Munro, I. G. (P) & (H)
Pratt, William
*Prescott, J. G.
Reid, G. McL.
Rylands, J. M. (H)
Seamer, J. H.
*Sutherland, Miss C. A.
Thomson, G. G. (A) & (H)
Walker, Charles
Walker, J. D.
Whitney, E. W. (A)
Wilson, William
Wood, Colin
Wright, Charles

* denotes 2nd class honours.
(P) denotes credit in Pharmacology.
(A) denotes credit in Anatomy.
(H) denotes credit in Hygiene.

FOURTH EXAMINATION:

Auchnie, J. A.
Caird, Miss E. A. Y.
Copland, Miss E. A.
Cowie, J. F.
Curry, G. D.
Fleming, J. A.
Head, K. W.
Henderson, G. L. B.
*Huddart, J. E.
Kerr, W. J.
Kydd, W. J. C.
Malloch, R. A. H. W. (Paras)
*Millar, Miss M. E.
Moodie, E. W.
Moore, E. R. (Paras)
Munro, I. B.
Philp, J. M.
Phillips, J. E.
Preston, Miss A. C.
Rafferty, G. C.
Riddell-Swan, J. M. (Paras)
Rodger, J. K.
Roe, D. M.
Soulsby, E. J. L. (Path)
Stockdale, H. G.
Tench, A. H.
Thomlinson, J. R.

* denotes 2nd class honours.
(Path) denotes credit in Pathology.
(Paras) denotes credit in Parasitology.

FINAL EXAMINATION:

Allan, Duncan
Andrew, Hubert
Bottomley, P. J.
Bownass, R. C.
Braithwaite, J. R.
Buie, Andrew
Cameron, John
Cencora, Tadeusz
Chadwick, I. M.
Colebrook, Frank
Donald, L. G.
Doroszynski, W. Z.
Duncan, J. M.
Dyce, K. M.
Fletcher, R. B.
Horrox, M. A.
Hunter, T. T.
*Marr, Alfred
Noble, Claude
Paterson, J. D.
Price, E. L.
Robson, John
Russell, G. H. H.
Slee, Allan
Snodgrass, Nigel
Strachan, John
Sullivan, E. W.
Thomas, Philip
*Wilson, J. C.
*Wilson, J. M.
Wilson, W. J.

* denotes 2nd class honours.

Glasgow

FIRST EXAMINATION:

Anderson, I. H.
Angus, C. G.
*Asher, R. A.
Baird, M. H. (C)
*Barton, D. J.
Bellinge, W. H. (B)
†Broom, T. M.
Burns, E. M.
*Callow, Michael
Clancy, E. B.
Dick, I. B.
Fitzsimmons, W. M.
Gibson, Robert
Goalen, H.
Isbister, J. (B)
*Lawson, R. B.
*Loudon, A. J. B.
*Lucas, J. M.
Lyons, A. R.
McCulloch, Buchanan (C)
McIntyre, D. I.
McPhee, A. A.
Morris, David
Mundell, David
Murdoch, M. I.
Murray, G. D.
Parker, F. J. (C)
Peritz, F. J.
Pronger, Mrs. F. M.
Randell, George (C)
Robertson, Donald (C)
Sanderson, John
Schwartz, C.
Scott, W. N. (C)
Skinner, D. I.
*Smith, J. M.
Sothern, J. M.
*Thompson, J. D.
Townley, Miss D. M.
Vincent, J. F. D. (C)
Waddelow, I. R.
Walls, T. J. R.
†Watkinson, D. E.
White, M. G.
Whiteford, Miss Joan

† denotes 1st class honours.
* denotes 2nd class honours.
(C) denotes credit in Chemistry.
(B) denotes credit in Biology.

SECOND EXAMINATION:

Andrew, A. S. (H)
Archibald, Miss H. I.
Barr, W. M.
Boyd, H. W. (P)
Buchanan, John (P)
Craig, J. H. G.
Crighton, G. W. (H)
Dexter, M. R. (H)
Dickson, Ian (H)
Doak, Miss M. S. P. (P)
Doyle, Joseph
Ferguson, Murdo
Filshie, H. P.
Fraser, A. F.
Geddes, Miss M. B.
Gracie, Archibald (P)
Heyworth, Brian
†Hosie, K. S.
Hugh, A. R.
*McCrone, R. R
Macdonald, I. S. (P)
Mackay, T. M.
McKerrell, A. L. L.
McNicol, O. D.
Madden, Edward (H)
Marshall, A. A. (P)
Mowat, G. N.
Ostler, D. C.
Payne, H. M.
†Sachs, Max
Shepherd, Gordon (P)
Strachan, T. A. (P)
Vallely, T. F. (P)
West, W. R. G.
Wright, E. D.

† denotes 1st class honours.
* denotes 2nd class honours.
(P) denotes credit in Physiology.
(H) denotes credit in Histology.

THIRD EXAMINATION:

Bain, Miss M. L.
Barclay, J. McL.
Bennett, J. R. (H)
Boyd, R. P.
Clark, H. R.
Dunn, T. J. (A) and (H)
Garrett, J. A. L.
Graham, D. T.
Hair, D. C. (P) and (A)
Hall, T. P.
Hamilton, D. F.
Harrison, N. J.
Hillman, R. W.
Howieson, J. T. (H)
*Jarrett, W. F. H.
Lindsay, T. P.
McAdoo, S. D.
Macinnes, D. I.
Mackie, A. M.
McMeekin, W. J. (A)
Millar, J. S.
Morris, W. M. S.
Nisbet, R. M.
Patterson, N. M.
Russell, David
Sommerville, John
Spence, Norman (A)
Strang, A. L. D.
Sutton, Miss B. M.
Thomson, E. C.
Wilson, R. L.

* denotes 2nd class honours.
(P) denotes credit in Pharmacology.
(A) denotes credit in Anatomy.
(H) denotes credit in Hygiene.

FOURTH EXAMINATION:

Aharoni, Chanan
Barr, R. B.
Bremner, D. A. T.
Cameron, I. H.
Carmichael, A. M. E.
Douglas, C.
Douglas, T. A.
Dunlop, J. C. M. (Path)
Forsyth, A. M.
Goodwin, Robert
Gordon, Miss E. D. (Paras)
Grindlay, Maurice
Kerr, J. D.
Lewis, A. C.
Lornie, David
Maclure, W. B.
McCulloch, J. L. M.
McFarland, M. J.
McMillan, W. P.
*McPhedran, Duncan
Main, William
Moors, W. M. (Path)
Munro, D. W. J.
Offord, E. C.
O'Hagan, Charles
Paton, I. M.
Pugh, R. J.
Torley, J. A.
Traub, L. D.
Warnock, Hugh
Young, I. J. B.

* denotes 2nd class honours.
(Path) denotes credit in Pathology.
(Paras) denotes credit in Parasitology.

FINAL YEAR:

Barr, W. A. B.
Campbell, A. D
Howie, T. W. T.
Kight, D. G.

(*Concluded at foot of 1st col., p. 373*).

QUESTIONS IN PARLIAMENT

Animal Health Division (Veterinary Surgeons)

On Monday last, Mr. Somerville Hastings asked the Minister of Agriculture how many appointments for veterinary surgeons in his Animal Health Division are unfilled; and what salaries are being offered for these posts.

Mr. T. Williams: There are about 140 vacancies on the permanent staff, of which 75 are at present filled by temporary officers. These vacancies are in the basic grade for which the salary scale in the country is £520 for men of 25 rising to a maximum of £960. The salary is slightly higher for veterinary surgeons stationed in London and certain provincial cities.

Mr. Hastings: Does my right hon. Friend regard this basic salary as sufficient considering the long training and the responsibility of the work involved?

Mr. T. Williams: My advisers are satisfied that these salary scales are regarded as satisfactory when compared with those of other professional and scientific civil servants.

Dr. Stephen Taylor: Is my right hon. Friend aware that, in some ways, it is more important to be a vet. than to be a doctor because his patients cannot tell him what is wrong with them; and, further, will he not have a look at these salary scales because they compare unfavourably with those for doctors?

Mr. Williams: I certainly do not disagree with the first part of my hon. Friend's question.

* * * * *

Veterinary Inspectors (Salaries)

Sir E. Graham-Little asked the Minister of Agriculture whether he is aware that widespread dissatisfaction is felt by veterinary officers of his Animal Health Division, expressed by resolutions recorded by the Central Veterinary Society and the Council of the National Veterinary Medical Association, with his decision regarding salaries and conditions of service; and, as this dissatisfaction must lead to increased reluctance on the part of veterinary surgeons to work for his Department, with resulting injury to the future welfare of the livestock industry, whether he will rectify this position.

Mr. T. Williams: I am, of course, aware of the views of the National Veterinary Medical Association, but I am satisfied that the salaries recently fixed for my veterinary inspectors (which are substantially higher than the salaries previously in operation) are reasonable in relation to the revised salaries of other scientific and technical officers of the Civil Service.

* * * * *

Bovine Tuberculosis

Mr. Hurd asked the Minister of Agriculture if he has now reached agreement with the veterinary profession and the N.F.U. on a national plan for the eradication of bovine tuberculosis; and when he expects that a start will be made.

Mr. T. Williams: No, Sir. Discussions with farming interests on a plan for establishing attested areas have not yet been concluded. Some difficult questions are involved and at the moment I cannot say when it will be possible to introduce such a plan. Noteworthy progress in the eradication of bovine tuberculosis is, nevertheless, already being made under the voluntary Tuberculosis (Attested Herds) Scheme which now includes well over a million cattle.

Kropiwnicki, M. S.	Semple, Matthew
Macinnes, Thomas	Simpson, Bert
Martin, W. B.	Urquhart, G. M. (M)
Pfaff, H. W.	Watt, James
Ross, J. G.	Wright, Miss C. M. F. (S)

(M) denotes credit in Medicine.
(S) denotes credit in Surgery.

Fowl Pest

On July 14th Lord Willoughby de Eresby asked the Minister of Agriculture if he will give the latest figures of the number of cases of fowl pest notified and the number of fowls ordered to be slaughtered.

Mr. T. Williams: Up to July 9th there have been 571 outbreaks of fowl pest in Great Britain and about 35,000 birds have been slaughtered.

Lord Willoughby de Eresby: In view of the fact that these figures go up every time I ask this Question and the fact that the adverse balance of our overseas payments also rises, does not the right hon. Gentleman think that the moment has come when the Government might well prohibit the import of poultry from countries where fowl pest is known to exist, in order to save dollar exchange and to wipe out fowl pest in this country?

Mr. Williams: Perhaps the hon. Member will be happy to know that the number of outbreaks is going down and down instead of up and up. The numbers of outbreaks in the last four weeks were 65, 40, 30 and 17 respectively. There is reason to hope that we are overcoming this problem.

NOTES AND NEWS

Diary of Events

July 27th—Aug. 1st.—N.V.M.A. Annual Congress in Edinburgh.

July 29th.—Meeting of the Association of Veterinary Inspectors, at the Royal (Dick) Veterinary College, Edinburgh, 3.30 p.m.

July 31st.—12th Annual Meeting of the Royal (Dick) Veterinary College Alumnus Association, at the Royal British Hotel, Princes Street, 7 p.m.

July 31st.—Annual Meeting of the Association of Veterinary Teachers and Research Workers, at the Royal (Dick) Veterinary College, Edinburgh, 10.30 a.m.

Aug. 20th.—Summer Meeting of the Eastern Counties Division, N.V.M.A., at King's Lynn (see Notice), 11.30 a.m.

* * * * *

Ministry of Agriculture—Veterinary Appointments

North of Scotland Division Resolution

At its meeting on June 7th, the North of Scotland Division of the N.V.M.A. passed the following resolution unanimously:—

> "The North of Scotland Division of the National Veterinary Medical Association places on record its full support of the N.V.M.A. in its effort to improve the status and salaries of the whole-time veterinary staff of the Ministry of Agriculture and Fisheries."

Erratum.—In the N.V.M.A. statement regarding the Ministry of Agriculture's advertisement for recruitment of veterinary staff appearing on page 359 of our last issue, in the penultimate line of paragraph one, *for* "consolidated" *read* "basic."

* * * * *

"Need of the Farming Community Rapid Recruitment of the Best Type of Man"

In the interests of British agriculture, the farming Press has expressed itself strongly in sympathy with the National Veterinary Medical Association in its stand against the imposition by the Ministry of Agriculture of inadequate salaries—and consequently status—for its veterinary staff.

The following editorial, which may be cited as typical, appeared in the July 15th issue of *The Farmer and Stock-Breeder*:—

"Someone is Wrong"

"For well over a year now there has remained unsettled the dispute over salaries between the National Veterinary Medical Association and the Ministry of Agriculture. Surely it is time this unfortunate point was settled once and for all. Until the grade of salaries is decided fresh talent will not be persuaded to follow the great and honourable veterinary profession, and that essential co-ordination between the Ministry and the Profession will shortly cease to exist unless there is a speedy settlement. In the ordinary way, the question would be referred to an independent arbitrator, but, in this case, the Treasury appears to have the last word.

"The dispute originally centred round the salary (£2,000 a year) of the Chief Veterinary Officer of the Ministry. The Association responsible for the Veterinary Profession pointed to the difference between this sum and the £3,000 a year of the Chief Medical Officer of the Ministry of Health, saying that the gap was far too great and reflected an unfair comparison between the standing of the two professions.

"Then followed a series of unhappy developments, including the Minister's withdrawal of an earlier accepted invitation to the National Veterinary Association's annual dinner last October, and the refusal to publish in the Association's journal advertisements for official veterinary appointments. Lately the N.V.M.A. has wisely reversed this latter decision, while reserving the right to express dissent from the salary scales and advise its members accordingly.

"More unsatisfactory, possibly, is the position revealed by an objective examination of the salaries themselves. . . . These seem out of tune with present-day conditions, even adding the bonus.

"At the moment the Ministry is presumably waiting to see if the response to its appeal for personnel is, in fact, inadequate. But the need of the farming community is the recruitment, as rapidly as possible, of the best type of man."

* * * * *

Exchange of Correspondence between Children of French and English Veterinary Surgeons

In our issues of June 21st and 28th, intimating the inauguration of the above correspondence exchange scheme, interested readers were requested to get into touch, as soon as possible, with Monsieur P. E. Godechoux, Editor of *L'Action Vétérinaire*, who was hopeful of placing children in contact with one another sufficiently early to enable mutual holiday visits to be paid this summer, should the letter-writing lead to such a pleasing development.

We hear that a number of the children of French veterinary surgeons have written to Monsieur Godechoux at 98, Avenue de Suffren, Paris XVe, asking for an English correspondent, but that, thus far, only one letter—from a veterinary surgeon—has reached him from this side.

To avoid disappointment to the French children, who evidently are eager to participate, and also to Monsieur Godechoux, the initiator of the project, who has kindly undertaken to act as the medium in the first instance, for the purpose of the exchange, we earnestly hope that the response from British parents and/or their children will be both widespread and prompt.

* * * * *

PERSONAL

Mr. W. G. Beaton's Appointment—A Correction

We much regret that, owing to a misunderstanding arising from the wording of the announcement as received, it was not indicated, in our issue of July 12th, that Mr. W. G. Beaton has been appointed *Acting* Director of Veterinary Services in Nigeria during the absence on leave in the United Kingdom of the Director, Mr. R. J. Simmons, C.B.E.

Deep apologies for the annoyance and inconvenience thereby caused are due not only to Mr. Beaton and Mr. Simmons, but also to Mr. John Morton, whose appointment as Deputy Director is also an "acting" one. When Mr. Simmons returns to duty both Mr. Beaton and he will revert to their substantive appointments.

. . . . .

Appointments.—The *Burma Gazette* announces that Lieut.-Col. G. Hinds, M.R.C.V.S., has been appointed Chief Veterinary Officer, Frontier Area Administration, Burma.

Mr. A. A. Lamont, B.SC., M.R.C.V.S., succeeds Mr. E. Conn as Chief Veterinary Officer at the Hampshire Cattle Breeders' Society's A.I. Centre at Lyndhurst, the latter having resigned his post on his return to Ireland. Mr. W. G. S. Angus, B.SC. (AGRIC.), M.R.C.V.S., has been appointed Assistant Veterinary Officer, in charge of the Andover Sub-Centre.

. . . . .

Illness of Mr. Arthur H. Watson.—We regret to learn that, while on holiday in Devon, Mr. Arthur H. Watson, of Bradford, was taken ill suddenly and that an operation was necessitated. Mr. Watson is in South Eden Nursing Home, Paignton, and our readers will be relieved to know that he is progressing favourably. On their behalf we extend our sympathy with him in his illness on the eve of Congress—at which he will be much missed—and express our earnest hope for his speedy and full restoration to health.

Doctorate for Mr. S. F. Barnett.—The Degree of Doctor of Philosophy in the Faculty of Science (London University) was conferred on Mr. Stephen Frank Barnett, B.SC., M.R.C.V.S., on July 11th, 1947.

University of Edinburgh Degrees.—At recent Graduation Ceremonies of the University of Edinburgh former students of the Royal (Dick) Veterinary College had Degrees conferred as follows:

The Degree of Doctor of Science in the Department of Veterinary Science: Anderson, James, B.SC. *Thesis.*—"Studies on the Physiology of Reproduction in Cattle and Sheep."

The Degree of Bachelor of Science in the Department of Veterinary Science: Clarke, Alfred Vernon; McCartney, William David Jamison; Wilkinson, Leonard, and Marshall, Peter McCallum.

. . . . .

Birth.—COTCHIN.—On July 13th, 1947, to Adelaide, wife of Ernest Cotchin (Ms.R.C.V.S.), a sister, Christine Mary, for Margaret and Charles.

* * * * *

Poultry Research in Great Britain

In a Press notice issued in February last, it was announced that, after consideration by the Agricultural Research Council and the Agricultural Departments, it had been decided in principle to establish at least two centres of poultry research, with wide terms of reference, one in England and one in Scotland, both serving the needs of Great Britain. It was further stated that work on certain subjects, such as the investigation of transmissible diseases, for which special conditions are needed, would be fostered at other appropriate centres.

In this connection the Ministry of Agriculture makes the following announcement:—

"It is now possible, after consultation with the Department of Agriculture for Scotland, to take the first step towards carrying these decisions into effect by establishing in Edinburgh a Poultry Research Centre to cover a wide range of fundamental scientific problems, excluding those connected with transmissible disease. The Centre will, at least in its earlier stages, be under the direct supervision and control of the Agricultural Research Council. In order that the work of the Centre may start immediately, it is intended to make temporary arrangements for accommodation in Edinburgh, so that the nucleus of a scientific staff, for which some trained personnel are already available there, can be formed as soon as possible. Dr. A. W. Greenwood, D.SC., PH.D., F.R.S.E.,* whose distinguished work in the field of poultry research is widely known, has accepted the Directorship of the Station. Dr. Greenwood has been associated with research in animal breeding and genetics and in the physiology of reproduction in the University of Edinburgh since 1923 and has since 1928 served on the staff of the Department of Animal Breeding and the Institute of Animal Genetics. He was acting Director of the Institute from 1940 to 1946, and during almost the whole of his scientific career has carried out his researches on poultry. He has recently returned from a Government Mission appointed to study poultry management and research and education in the U.S.A. A note on Dr. Greenwood's career is given below.

"The new Research Centre will not itself be concerned with developmental work and field trials or with the husbandry aspects of poultry management. This in Scotland will largely be the task of the Agricultural Colleges and the Advisory Service, acting in close collaboration with the Research Centre.

"In consultation with the Ministry of Agriculture and Fisheries, the Council will give early consideration to the possibility of establishing a second Poultry Research Centre or Unit in England: but their plans must necessarily be affected by the shortage of trained staff.

"To assist them in the general co-ordination and planning of poultry research in Great Britain the Agricultural Research Council will shortly appoint a Technical Committee on Poultry Research, which will include in its membership both scientific workers and those concerned with the practical affairs of the Poultry Industry."

* Dr. Greenwood, an Australian by birth, was educated at Melbourne University, where he graduated with First-Class Final Honours in Zoology and holds the degrees of M.Sc. and D.Sc. He came to work in Edinburgh under Professor F. A. E. Crew in 1923 and obtained the degree of Ph.D., Edinburgh, in 1925, joining the staff of the Animal Genetics Institute (then the Department of Animal Breeding) in 1928. In 1931 he worked in Columbia and Chicago Universities. From 1940 to 1946 Dr. Greenwood was Acting Director of the Institute of Animal Genetics of Edinburgh University. Dr. Greenwood is a Fellow of the Royal Society of

Edinburgh, of which he has been a member of Council and a Vice-President. He received the Keith Prize of the Society for his study on the biology of the fowl.

* * * * *

XIth International Congress of Pure and Applied Chemistry

During the period July 14th to 31st there were held in London the following associated events: The centenary of the Chemical Society, the XIth International Congress of Pure and Applied Chemistry, and the Annual General Meeting of the Society of Chemical Industry.

The XIth International Congress of Pure and Applied Chemistry was opened by Viscount Leverholme at the Central Hall, Westminster, on July 17th. The fourteen sections, which included "Chemistry in relation to Applied Zoology and Veterinary Science" (Section 6), under the chairmanship of Dr. W. R. Wooldridge; "Chemistry in relation to Agriculture and Applied Botany" (Section 5; chairman, Professor T. Wallace); "Chemistry in relation to Food and Nutrition (Section 7; chairman, Sir Jack Drummond), and "Chemistry in relation to Medicine and Therapeutics" (Section 8; chairman, Dr. C. R. Harington), met every morning, while the afternoons were devoted to the delivery of lectures by chemists of international standing. There was, of course, a large number of social engagements, including luncheons and dinners at which the hosts were the Lord Mayor, the Salters Company and large commercial organizations. An interesting function was the reception given by the Parliamentary and Scientific Committee on the afternoon of Tuesday, July 22nd.

The programme of the Section of Applied Zoology and Veterinary Science commenced on Friday, July 18th, with a joint session with Section 7, when the following papers were discussed under the general heading "Nutrition in relation to Diseases," *viz.*: "Nutrition in relation to Disease in Farm Animals," Professor Dr. L. Seekles; "Vitamin A and the Health of Farm Animals," Professor G. H. Hart; "Neonatal Ataxia of Lambs," Dr. H. H. Green; "Nutrition and Disease in Early Life," Professor A. N. Worden; "The Influence of Soil upon Animal Health," Dr. James Stewart; and "Problems in Animal Nutrition in Sweden during the War Period 1939–1945. The Use of Wood Pulp (fodder cellulose) and Silage made with added Acids," Dr. S. Nordfeldt.

On the following day the section discussed (jointly with Section 8), "Endocrinology and Carcinogenesis," and on July 22nd "Chemotherapy of Protozoal Infections," when the papers were: "The Effects of Sulphonamides on *Eimeria tenella*," C. Horton-Smith and E. Boyland; "The Chemotherapy of *amidines*," H. J. Barber; "Phenanthridinium compounds and Bovine Trypanosomiasis," L. P. Walls; "Chemotherapy of Bird Malaria," J. Schneider and — Decourt.

"Insecticides" was the general subject for consideration on July 23rd, in conjunction with Section 5, as follows: "Modern Insecticides," F. P. Coyne, E. Holmes and J. S. Steward; "Recent Work in connection with Tsetse Control," C. B. Symes; "The Mode of Action of DDT on Insects," P. Laüger; and "Physico-chemical Factors involved in the Large-Scale Applications of DDT and their significance in connection with Insecticide Response," W. A. Waters.

* * * * *

LEGAL NOTES

Veterinary Council of Ireland's Successful Prosecution: Failure of Appeal.—In our issue of June 21st we reported that at Birr Court, Edward King, Grange, Lorrha East, Birr, was fined £5, with £18 9s. expenses, when prosecuted by the Veterinary Council of Ireland for practising veterinary surgery by operating with a probing on a cow owned by Michael Quigley, Ballyglass, Portumna, while not being a registered veterinary surgeon, in contravention of Section 46(1) of the Veterinary Surgery Act.

Defendant appealed against Mr. Justice Coffey's decision, and the case was heard by Judge Gleeson at Birr Circuit Court on July 11th.

Mr. W. Callan, Barrister-at-Law (instructed by Mr. A. D. Comyn, Solicitor, Loughrea) appeared for appellant: and Mr. T. B. Hannin, Barrister-at-Law (instructed by Messrs. R. F. Barry and Son, Solicitors Birr) for the Veterinary Council of Ireland (complainants and respondents).

Affirming the District Justices decision, the Judge allowed a further £10 10s. Circuit Court costs and £15 15s. expenses, and said he did not see any need to increase the £5 fine. The Judge described the case as "one of great importance to veterinary surgeons and persons practising veterinary medicine in this country."

* * * * *

Bull Fight: Application to Restrain Broadcast Dismissed.—In the High Court on July 18th, Mr. Justice Jenkins dismissed, with costs, the motion by the plaintiff, Mr. Edmund T. MacMichael, suing on behalf of himself and of the Performing Animals Defence League, of which he is director, for an injunction to restrain the defendants, the British Broadcasting Corporation, from broadcasting a commentary on a bull fight.

Mr. MacMichael, who appeared in person, said that the commentary was announced for inclusion in "Easter Journey" the next (Saturday) evening. One of the league's objects was to prevent the introduction of bull fights into this country. He wrote to the defendant corporation in May stating that he protested "against the attempt to familiarize the British public with a foreign form of cruelty." Mr. MacMichael read an affidavit by a retired clergyman who had heard the original broadcast in May, and who said that the impression left on him was that the bull fight was being presented by the defendant corporation as an exciting, dramatic, glamorous, bloodthirsty but commendable sport, and that it gave him a terrible shock to hear Easter religious services from various parts of Europe followed by such a commentary. He (the plaintiff) took the view that the broadcasting of the commentary would make the league's work difficult.

Mr. Upjohn, K.C., for the Corporation, said that "Easter Journey" would be incomplete without the commentary, and that the corporation objected to the suggestion that they put forward bull fighting as a great and glorious sport. They were portraying Easter in Spain, and the bull fight was part of the life of the Spanish people. To say that the corporation put it forward as something desirable to be introduced into England was wholly false.

Mr. Justice Jenkins, in giving judgment, said that the suggestion that the broadcast was calculated to encourage bull fighting in England was somewhat far-fetched. It was plain that it would not infringe any legal right of the plaintiff or of the league. Those who liked the commentary could listen; those to whom it was objectionable could turn it off. It was, however, quite out of the question to hold that a section of the public who did not like it would on that ground be entitled to restrain the corporation from broadcasting it.

If programmes were to be emasculated when other countries were described lest anything might be mentioned with which we did not agree, or which we considered objectionable and which was not done in this country, it would be extremely dull, and would not be an objective presentation of life in the world as it was. The motion was misconceived and would be dismissed, with costs.

* * * * *

Memorandum on Cost-of-Living in Malaya

These notes, which have been prepared as the result of correspondence with members in Malaya, are intended for the guidance of intending applicants for vacancies in the Colonial Veterinary Service in Malaya (including Singapore).

1. Salaries

The time-scale for most Departments in Malaya is $400 \times 25—800$ per month.

Note.—(i) $1 (Straits) = 2s. 4d. Sterling.

(ii) Salary in $ per month $\times$ 14/10 = Salary in £ per annum.

e.g., $500 p.m. = £500 $\times$ 14/10 = £700 p.a.

The initial salary for the Veterinary and Medical Departments in Malaya is, however, $500 p.m., *i.e.*, four increments ahead of the initial salary of the normal time-scale.

2. Duty Posts

There are 17 duty posts on the Establishment, nine of which are filled by officers in permanent employment. There are eight vacancies, exclusive of a Leave reserve. Of the 17 duty posts five are superscale appointments at salaries varying between $850 for the Chief Veterinary Officer, Singapore, and $1,200 p.m. for the Director of Veterinary Services, Malayan Union.

3. Allowances

(i) Married officers draw a temporary Cost-of-Living Allowance (= C.L.A.) of $160 p.m. and single officers $110 p.m. These C.L.A.s were only granted after very urgent representations had been made to the Malayan Governments by the Malayan Governments' Professional Officers' Association who submitted that the old salary scale (which has remained unaltered for some 20 years) made it quite impossible for a married officer to make ends meet.

(ii) An Education Allowance is paid in respect of the children of European officers at the following rates:—

$70 p.m. for the first child until it attains 18 years of age, and

$50 p.m. for the second child until it attains 18 years of age.

When the first child reaches 18 years of age the allowance at the higher rate passes to the second child and a third child would then come on to the lower rate.

4. Income Tax

No tax is at present levied on salaries in Malaya but the

Malayan Government has given the assurance that it will be introduced in 1948 at the latest. It is idle to speculate on what the rate will be.

5. House Rent

At the time of going to press (July, 1947) no house rent is being charged to officers occupying Government quarters in the Malayan Union, although officers stationed in Singapore are paying 6 per cent. of their salaries monthly. It is inevitable that house rent will be reintroduced in the Malayan Union very shortly.

6. Widows and Orphans Pensions Scheme

When an officer has completed three years' service he is (if not on a short-term contract) placed on the Pensionable Establishment and he then contributes 4 per cent. of his salary monthly.

7. Cost-of-Living in Malaya

The cost-of-living in Malaya at present is extremely high and intending candidates for posts there should not be led astray by statements appearing in the Press to the effect that a married couple can "live reasonably" on $400 p.m. This statement was recently issued by the Department of Public Relations, Malayan Union, and raised a storm of protests in Malaya. Many attributed the publication of this statement to the fact that the Malayan Government had been unsuccessful in recruiting for the professional Departments particularly, and interpreted it as an attempt to obtain recruits by doubtful means. From all sources in Malaya, commercial as well as Government, the comment is made that unless some relief is afforded, either by increased salaries and/or increased C.L.A. which will more than offset the incidence of income tax, not only will the European's standard of living be still further depressed but that he will have radically to alter his plans for himself and his family for the future. There seems to be little doubt that there is a great measure of discontent throughout Government service in Malaya at the present time.

The wages of servants in Malaya have increased by not less than three times their pre-war figures. Food, drink, tobacco and entertainment are all not less than twice their pre-war costs (and many items of each group are very considerably more than this) and furniture, furnishings and clothes are several times their costs pre-war. Whilst all these factors are operating concurrently the European's salary remains on its pre-war scale, with such annual increments as he may have earned during the war years. The C.L.A. granted (maximum = $160 p.m., irrespective of salary) was not intended to bridge the gap between the pre- and post-war cost-of-living but was regarded more as an assistance *towards* the increased costs. The Pyke Committee, sitting in Malaya, made certain recommendations, which were published and implemented, on the allowances which should be paid to the non-European subordinate staff. The original C.L.A. to European officers was the same as that which could be drawn by a non-European subordinate on a salary of $150 p.m. The Pyke Committee's recommendations in respect of European officers, which would have taken into consideration all factors operating in Malaya plus the increased cost of educating children here at home and the possibility that, as their children grew older, it might be necessary to maintain two homes, one in Malaya and one in the U.K., have not been made public. The Professional Officers' Association appear to have made strong representations to Government on this subject and have succeeded in increasing the C.L.A.s to their present maxima of $160 p.m. for married and $110 for unmarried officers. It seems that this C.L.A. bears little relation to the increased cost-of-living, excluding all considerations of house rent and income tax, which are still to be imposed. It is an arbitrary figure which, although of great help, has not removed from the minds of a great number of officers anxiety as to how to meet all their commitments. If, in the meantime, house rent and income tax are levied, before any revision of salaries and/or C.L.A. occurs, it is difficult to see how married officers, in particular, can continue to subsist without again falling back on capital, which many had to do prior to the granting of C.L.A.

It appears to be commonly accepted that a married couple, without children, cannot at the moment live on less than $600 p.m. This figure includes food, soft drinks, a cook, an "amah" (who does the household laundry and gives some assistance in the house), a car driver (a form of insurance against theft) and, possibly, the part-time services of a gardener. It takes no account of firewood, the club bill, electricity, papers, alcoholic drinks, clothing, holidays, household replacements, insurances, house rent or income tax, nor of expenses in connection with children.

A Veterinary Officer in Malaya will have to acquire a car, for which he can obtain a loan from Government, repayable in 36 monthly instalments. He receives certain allowances for the car which cover the cost of travelling on duty. Private running, of course, has to be paid for.

8. Salary Commission

A Salary Commission to revise the salaries of Government employees in Malaya and Singapore is either already sitting in Malaya (July, 1947) or will shortly do so. It seems fair comment that unless the inducement to enter the Colonial Service in Malaya is made considerably more attractive than it is at present, recruits for any of the professional Departments will be even slower in appearing than has been the case during the past twelve months.

9. General

Intending candidates for the Colonial Veterinary Service who wish to apply for a post in Malaya would be well advised to contact the N.V.M.A. in the first instance for the latest information available on conditions in Malaya. For a bachelor the initial salary and allowances appear reasonable. He would be sharing expenses with other bachelors in a mess or with a married couple on whom he might be billeted, and his total expenses would be less than half those of a married couple. But for a married officer, and even more so in the case of an officer with children, the financial aspect of service in Malaya under existing conditions should, the N.V.M.A. advises, be examined with the utmost care to avoid subsequent disillusionment and disappointment.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

FOOT-AND-MOUTH DISEASE:

Worcestershire.—Trotshill Farm and Tolladine Golf Course, Warndon, Worcester (July 14th); Cokefield and Orchard adjoining Tolladine Golf Course, Worcester (July 17th).

SWINE FEVER:

Morayshire.—Kennieshillock House, Lhanbryde, Morayshire (July 19th).

SHEEP SCAB:

Denbigh.—Tan-y-Pistyll, Llanrhaiadr-ym-Mochnant, Oswestry (July 16th).

Merioneth.—Garthisen, Llandrillo; Pentre Bach, Llandrillo; Ty Ucha, Llandrillo, and Branas Isaf, Llandrillo, Merioneth (July 14th).

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Mr. C. Page, the Sanitary Inspector of the Hollingbourne Rural Council (Kent) told the Council, at its June meeting, that he had had to condemn 489 lb. of the best beef that he had inspected for many years. The condemnation of 420 lb. of it was due to putrefaction, and the remainder to bone taint. Only too often meat had to be thrown away because the animals were killed immediately after travelling, and their blood was not sufficiently drained. He was also of the opinion that the slaughterhouses in the district were too small.—*Meat Trades Journal.*

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents should write as briefly as possible and letters should not exceed 350 words.

PREGNANCY DIAGNOSIS BY PALPATION OF FOETAL MEMBRANES

Sir,—In his letter of June 20th, Mr. W. F. Davison, F.R.C.V.S., of Dublin, advocates palpation of the foetal membranes as being a most reliable method of diagnosing pregnancy in the early stages. May I, as a member of the Canadian veterinary profession and a former government and army veterinarian, support his claim and say that, to my knowledge, this method has been employed by leading Canadian veterinarians since 1911.

Yours faithfully,

"Homedene," W. T. GALBRAITH.
6, Lower Manor Road,
Farncombe, Surrey.
July 14th, 1947.

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Sir,—I wish to support the claim made by Mr. W. F. Davison in his letter to you under the above heading, dated June 20th, 1947.

I make no claim to expertness in the examination of cows per rectum, but I find palpation of the foetal membranes to be an easy and reliable method of diagnosing pregnancy. It is also very useful in the differential diagnosis of early pregnancy from pyometra.

Yours faithfully,

14 and 16, Queen's Road, F. R. SPRATLING.
Reading.
July 17th, 1947.